The 2002 - 2004 STIP Conformity Analysis

for

Maine's Nonattainment and Maintenance Areas
including the
PACTS, LACTS & KACTS MPO Areas

Prepared by

the

Maine Department of Transportation
Bureau of Planning

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Executive Summary

TRANSPORTATION CONFORMITY REQUIREMENTS

According to EPA's Final Conformity Rule, to conform to the Maine State Implementation Plan (SIP), the Statewide Transportation Improvement Program (STIP) for the nonattainment and maintenance areas, including the Metropolitan Planning Organizations (MPOs), must show a reduction in VOCs and NO_x from the build versus nobuild scenarios, a reduction from the 1990 level, or the emissions budget. The following analysis of the 2002 - 2004 STIP successfully passes the required test(s) for each air quality planning area and each of the MPO's located in Maine's nonattainment and maintenance areas.

Build/NoBuild Test

The build/nobuild analysis begins with a project by project examination of future emissions with and without each project. Assumptions were made, where necessary, to allow the projects to be analyzed in 2006, 2015 and 2020. The emissions effects of all nonexempt projects are then totaled by year and air quality planning area. A positive result indicates an emissions reduction due to the implementation of the project(s). A negative result indicates an emissions increase. Implementation of the 2002 - 2004 STIP will result in a reduction of emissions for each planning area and each applicable MPO. The unit of measure for emissions is kilograms per summer day.

1990 Comparison Test

Maine has a transportation model that covers the nonattainment area and allows the comparison of emissions from the 1990 level with the 2006, 2015 and 2020 levels. The PACTS and LACTS MPOs have models and they were used for their respective areas.

This method, called the "1990 Comparison" in the following report, utilizes the vehicle miles of travel (VMT), and speed estimates which established the 1990 onroad mobile source emission inventory (part of a SIP submittal). The VMT and the emission factors, located in the Technical Appendix, calculate the emissions in each ozone nonattainment county for a typical summer day in 1990.

To estimate emissions in each of the three target years the 1995 VMT was expanded (see VMT Growth in the Technical Appendix) to 2006, 2015 and 2020 levels for Planning Areas 1, 2, 3 and 4. The emissions were then recalculated using the VMT projections and the appropriate emission factors for each nonattainment county. The results were then summarized by county, year, and ozone precursor (VOC and NO_x). The resulting tables can be found on pages TA-122 through TA-175. As can be seen from the tables, emissions are reduced from the 1990 level.

Emissions Budget Test

Maine has developed emissions budgets for VOCs in area #1 and VOCs and NO_x in area #4 that will be used for comparisons of mobile emissions. The "Build/No Build Comparison" and "1990 Comparison Test" are replaced by the "Emissions Budget Comparison" in those conformity tests. We have shown that the projected emissions in 2006, 2015 and 2020 are less than the emissions budgets. This method of analysis satisfies our conformity requirement.

PM-10 Nonattainment - Presque Isle

The pertinent federal guidance was followed to demonstrate conformity of the Transportation Plan activities in the Presque Isle nonattainment area.

Note: Much of the technical information in this analysis is located in the Technical Appendix. This was done in an attempt to make this analysis easier to follow and understand. If additional technical information is desired it can be provided upon request.

Emissions Modeling

Mobile 5a, the model used to develop the county emissions factors, does not lend itself to easily modeling the Inspection and Maintenance Program in Maine. Therefore, the Inspection and Maintenance Program was not completely modeled to include the pressure gas cap benefits. This action was coordinated with the Maine Department of Environmental Protection and U.S. Environmental Protection Agency.

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Introduction

This analysis constitutes the State of Maine Department of Transportation (MDOT) and Urbanized Area Conformity Determination with respect to Maine's State Implementation Plan (SIP). Submission is made in response to the Clean Air Act (CAA) and the Clean Air Act Amendments (CAAA) to the U.S. Department of Transportation (USDOT) for approval.

Section 176(c) of the CAA prohibits USDOT from giving its approval to any transportation plan or transportation improvement program[1] (TIP) which does not conform to the SIP approved or promulgated in accordance with the requirements of the CAA. The Act defines conformity to the SIP as: 1) conforming to the implementation plan's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards (NAAQS) and achieving attainment of the standards; 2) assuring that transportation activities will not cause or contribute to any new violation of any standard[2] in any area, or increase the frequency or severity of existing standard violations, or delay attainment of the standard; and 3) requiring that any transportation control measures[3] contained in the SIP be put into effect as required by the SIP.

The analysis was completed in strict adherence to the U.S. Environmental Protection Agency's (EPA) "Transportation Conformity Final Rule".

The final rule on transportation conformity was promulgated by EPA on November 24, 1993, (Federal Register, Vol. 58, No. 225). The rule establishes requirements for conformity determinations. The structure and concepts for conformity demonstrations are relatively straightforward. Key components of the regulation are: 1) applicability; 2) consultation procedures; 3) general requirements; 4) specific conformity tests; and 5) methodology.

The final conformity regulation has been amended three time since it was promulgated. The first amendment published on August 7, 1995, aligned the lapsing of conformity with the sanction clock. The second amendment labeled miscellaneous amendments became final on November 14, 1995. A third amendment was effective September 15, 1997 and allows a more streamlined and flexible conformity process.

1) Applicability

According to the federal rule, conformity determinations are required in nonattainment areas[4] and maintenance areas[5] for the adoption, acceptance, approval or support of the transportation plans, TIPs, and any regionally significant projects[6]. Conformity determinations

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1 *transportation improvement program* - is a staged multiyear, intermodal program of transportation projects.

2 *standard* - means the national ambient air quality standard.

3 *transportation control measure* - is a specific project or program which reduces vehicle emissions by reducing vehicle use or changing traffic flow or congestion conditions.

4 *non-attainment area* - is an area which does not meet the national ambient air quality standard for ozone, carbon monoxide, particulate matter, or nitrogen dioxide.

5 *maintenance area* - is an area which has violated air standards in the past but now is implementing plans to maintain healthy air.

6 *regionally significant project* - is a project or a facility which serves regional transportation needs and includes as a minimum all principle arterial highways.

are only required for transportation related criteria pollutants. In ozone nonattainment and maintenance areas, conformity must be demonstrated for volatile organic compounds (VOCs) and for nitrogen oxides (NOx). In Maine, seven counties are designated nonattainment and two counties are designated as maintenance. Maine's only nonattainment area for particulate matter less than 10 microns (PM-10) is located in downtown Presque Isle, within a one-half mile radius of the Northeastland Hotel. No carbon monoxide or nitrogen dioxide nonattainment areas have been identified in Maine. Therefore, the focus of this analysis is on ozone nonattainment and maintenance areas, and the PM-10 nonattainment area. The ozone nonattainment area within the state was subdivided into four "Designated Areas for Air Quality Planning Purposes" by 40 CFR Part 81. Each area is defined in the following table along with its ozone classification.

AREA #	COUNTIES	CLASSIFICATION
1	York, Cumberland, Sagadahoc	Moderate
2	Androscoggin, Kennebec	Moderate
3	Knox, Lincoln	Moderate
4	Waldo, Hancock	Maintenance

The areas listed above were classified as nonattainment or maintenance for ozone based on exceedences of the 1-hour NAAQS standard. On June 5, 1998 and again on June 9, 1999, EPA revoked the 1-hour standard for areas across the country that had demonstrated three years of clean data.. All of Maine's areas, Air Quality Planning Areas 1, 2, 3, and 4 met the requirements. Because of this action, these areas, with the exception of area 4, were relieved from all conformity requirements until EPA reinstated the 1-hour NAAQS standard on July 20, 2000 to become effective January 16, 2001.

A map showing these Air Quality Planning Areas (AQPA) is included on page TA- 1 in the Technical Appendix.

In the case of Maine's Presque Isle PM-10 nonattainment area, transportation related precursors of PM-10 have not been identified as a significant contributor to the PM-10 nonattainment problem. Furthermore, Maine's PM-10 attainment plan, currently being evaluated by EPA, does not establish an emission budget[7] for transportation related PM-10 precursors as part of the state's attainment strategy. Therefore, in accordance with Section 51.394(b)(3)(iii)(A) and (B) of EPA's Final Transportation Conformity Rule, transportation related PM-10 precursors do not need to be analyzed in the air quality analyses prepared for conformity (see PM-10 map and letter included on page TA- 2 and TA- 3 of the Technical Appendix).

A Joint Memorandum of Understanding (MOU) was executed on February 25, 1991, between the City of Presque Isle and the State DOT and DEP. Since this MOU established the attainment plan there has been one monitored violation of the PM-10 standard. The violation was due to a unique circumstance and does not constitute a plan deficiency.

The projects identified in this conformity analysis are projects identified in MDOT's 2002 - 2004 STIP. The LACTS, KACTS and PACTS MPOs are located within the

[7] *emission budget* - is the portion of total allowable emissions allocated by the applicable implementation plan to highway and transit vehicles.

nonattainment areas and therefore analysis of the projects contained in their TIPs are contained within this document. The projects that have been analyzed are listed in the project appendix.

2) Consultation Procedures

The rule requires the development of a consultation process involving all conformity stakeholders and the public. It also requires that the process the State of Maine develops has a provision ensuring consultation. Each state subject to this rule is required to submit a revision to the SIP that contains the criteria and procedures for determining conformity in that state. Maine has not adopted a consultation conformity SIP at this time. Until such a SIP is promulgated, the federal rule 40 CFR Part 51.402 establishes the minimum requirements and procedures to be followed. A principal task for the consulting agencies is to agree on the models to be used, and input assumptions associated with those models. This consultation process applies to transportation and travel demand assumptions as well as discussion of the emissions factor model.

MDOT has consulted with the Maine Department of Environmental Protection (MDEP) and the U.S. Environmental Protection Agency (EPA) on the setup and use of the mobile 5a emissions model. Because of this consultation with the environmental agencies, MDOT has revised its model inputs and its conformity analysis process for this conformity analysis. The analysis now uses county specific vehicle miles traveled (VMT) mix inputs and generates emissions factors for each county. The changes were made in order to bring MDOT's methodology and emissions numbers used in the conformity process in line with the MDEP's methodology and emissions numbers published in the 1990 base line emissions inventory and the 15% VOC reduction plan.

MDEP, Bureau of Air Quality Control, has reviewed and concurs with all of MDOT's mobile 5a input files, output files and emission factors. The data can be found in the Technical Appendix on page TA -95. A letter from DEP's Bureau of Air Quality Control verifying the input files are correct can be found on page TA - 179 in the Technical Appendix.

MDOT submitted draft copies of the conformity analysis to each MPO in Maine's nonattainment areas. Air Quality Planning Area #1 is composed of two MPO areas (KACTS & PACTS) and a doughnut area outside the two MPO boundaries. Air Quality Planning Area #2 contains the LACTS MPO area and a doughnut area outside the MPO boundary. The total on road mobile emissions (VOCs and NOx) from each of the areas within each Air Quality Planning Area must be combined in order to pass the conformity criteria. Letters from the directors of the LACTS, KACTS and PACTS approving the conformity analysis for their respective areas will be included in the Technical Appendix when the final document is published.

3) General Requirements

The rule requires that the conformity analysis must be based on the most recent planning assumptions and emissions model.

MDOT and the other consultation agencies agree on the statewide transportation demand model as the best way to estimate VMT growth and evaluate project impacts. Maine's statewide transportation demand model is being used for this analysis. Along with the statewide model, MDOT was able to utilize the PACTS and LACTS regional transportation demand models where appropriate for this analysis on projects within their respective boundaries.

Section 51.418 of the final conformity rule requires that MPO plans, MPO TIPs and projects outside the MPO areas must provide for the timely implementation of any transportation control measures (TCM) specifically identified in the SIP. At this time there are no TCM's specifically identified in Maine's SIP. Therefore, this condition is met.

4) Conformity Tests (Planning areas)

The applicable conformity test depends upon what stage in the regulatory process the state is in and whether or not an emissions budget has been approved. Maine has submitted its 15% VOC reduction plan required for air quality planning area #1, which includes an emissions budget for VOCs. To date, EPA has not approved this SIP revision. Maine also submitted a Maintenance Plan for air quality planning area #4, which includes budgets for VOCs and NO_x. The Maintenance Plan was approved by EPA on April 29, 1997. The applicable conformity tests are as follows:

1) Build Emissions[8] < No Build Emissions[9] (for area #1 NO_x and areas #2 and 3 for VOC and NO_x)

2) Build Emissions < Emission Budget (for area #1 VOCs & area #4 VOCs & NO_x)

3) Build Emissions < 1990 Baseline Emissions (for area #1 NO_x and areas #2 and 3 for VOC and NO_x)

In order for the program to conform to the SIP, the analysis must pass the applicable tests. Accordingly, the conformity tests must be met in each of the air quality planning areas for each analysis year. The first test, **Build Emissions < No Build Emissions**, demonstrates that the build emissions are less than the no-build emissions. The build emissions are generated by combining the no-build emissions with the project level emissions for each area. Project level emissions are a project-by-project examination of the build emissions for all of the projects requiring analysis, with the results aggregated for each AQPA included on pages 7 - 13. The project analysis section analyzes each project individually and calculates the emissions generated or reduced by the project for the years of 2006, 2015 and 2020. The project analyses are included in the Project Analysis Appendix on pages PA - 1 to PA - 14. The no-build emissions are generated using only the projected VMT growth with consideration of the projects included in past programs.

The second test, **Build Emissions < Emission Budget - *if a budget is established***, demonstrates that the build emissions are less than the applicable emissions budgets. The proposed emissions budgets are established in the SIP's 15% RFP and Maintenance plans.

The third test, **Build Emissions < 1990 Baseline Emissions**, demonstrates that the build emissions are less than the 1990 baseline emissions. The 1990 base year emissions are established in the SIP's 1990 emissions inventory.

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8 *Build Emissions* - emissions generated by predicted VMT growth combined with project emissions.

9 *No Build Emissions* - emissions generated by predicted VMT growth alone.

The conformity test summary is found on page 6 for each area and each analysis year. **All the required conformity tests were met in each air quality planning area for each analysis year**.

Northern Maine's PM-10 nonattainment area (Air Quality Planning Area #6) is located in Presque Isle. The 2002 - 2004 STIP does not include any projects located within the PM-10 nonattainment area. Therefore, this area conforms to Maine's State Implementation Plan.

The 2002 - 2004 STIP therefore conforms to the State Air Quality Implementation Plan.

CONFORMITY TESTS

[To convert kg to tons use the formula kg X (2.205/2000)]

AIR QUALITY PLANNING AREA #1 EMISSIONS (Kg/Summer Day)

YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	25,109.54	36,502.94	24,554.53	33,187.15	25,285.19	33,611.65
NO BUILD		36,581.54		33,263.75		33,684.66
BUDGETS	27,143.00		27,143.00		27,143.00	
1990 Emis		56,673.00		56,673.00		56,673.00

	Results		
Appropriate Test	2006	2015	2020
BUILD< NO BUILD (NOx ONLY)	Pass	Pass	Pass
BUILD< BUDGET (VOC ONLY)	Pass	Pass	Pass
BUILD< 1990 EMIS (NOx ONLY)	Pass	Pass	Pass

AIR QUALITY PLANNING AREA #2 EMISSIONS (Kg/Summer Day)

YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	11,300.59	14,480.16	10,964.00	13,251.76	11,249.46	13,398.63
NO BUILD	11,308.23	14,488.55	10,970.86	13,259.98	11,256.25	13,406.87
1990 Emis	18,979.00	22,099.00	18,979.00	22,099.00	18,979.00	22,099.00

	Results		
Appropriate Test	2006	2015	2020
BUILD< NO BUILD VOC	Pass	Pass	Pass
BUILD< NO BUILD NOx	Pass	Pass	Pass
BUILD< 1990 EMIS VOC	Pass	Pass	Pass
BUILD< 1990 EMIS NOx	Pass	Pass	Pass

AIR QUALITY PLANNING AREA #3 EMISSIONS (Kg/Summer Day)

YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	3,219.54	4,725.27	3,165.06	4,437.68	3,272.94	4,531.91
NO BUILD	3,230.32	4,738.12	3,174.74	4,449.78	3,282.53	4,543.95
1990 Emis	5,833.00	6,559.00	5,833.00	6,559.00	5,833.00	6,559.00

	Results		
Appropriate Test	2006	2015	2020
BUILD< NO BUILD VOC	Pass	Pass	Pass
BUILD< NO BUILD NOx	Pass	Pass	Pass
BUILD< 1990 EMIS VOC	Pass	Pass	Pass
BUILD< 1990 EMIS NOx	Pass	Pass	Pass

AIR QUALITY PLANNING AREA #4 EMISSIONS (Kg/Summer Day)

YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	5,090.68	7,221.29	5,041.72	6,847.72	5,233.43	7,023.27
BUDGET	5,842.00	8,029.00	5,842.00	8,029.00	5,842.00	8,029.00

	Results		
Appropriate Test	2006	2015	2020
BUILD< BUDGET VOC	Pass	Pass	Pass
BUILD< BUDGET NOx	Pass	Pass	Pass

CONFORMITY TESTS

[To convert tons to kg use the formula (tons X 2000) X .4536]

AIR QUALITY PLANNING AREA #1 EMISSIONS (Tons/Summer Day)						
YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	27.683	40.244	27.071	36.589	27.877	37.06
NO BUILD		40.331		36.673		37.14
BUDGETS	29.920		29.920		29.920	
1990 Emis		62.482		62.482		62.482

	Results		
Appropriate Test	2006	2015	2020
BUILD< NO BUILD (NOx ONLY)	Pass	Pass	Pass
BUILD< BUDGET (VOC ONLY)	Pass	Pass	Pass
BUILD< 1990 EMIS (NOx ONLY)	Pass	Pass	Pass

AIR QUALITY PLANNING AREA #2 EMISSIONS (Tons/Summer Day)						
YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	12.459	15.964	12.088	14.610	12.403	14.772
NO BUILD	12.467	15.974	12.095	14.619	12.410	14.781
1990 Emis	20.924	24.364	20.924	24.364	20.924	24.364

	Results		
Appropriate Test	2006	2015	2020
BUILD< NO BUILD VOC	Pass	Pass	Pass
BUILD< NO BUILD NOx	Pass	Pass	Pass
BUILD< 1990 EMIS VOC	Pass	Pass	Pass
BUILD< 1990 EMIS NOx	Pass	Pass	Pass

AIR QUALITY PLANNING AREA #3 EMISSIONS (Tons/Summer Day)						
YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	3.550	5.210	3.489	4.893	3.608	4.996
NO BUILD	3.561	5.224	3.500	4.906	3.619	5.010
1990 Emis	6.431	7.231	6.431	7.231	6.431	7.231

	Results		
Appropriate Test	2006	2015	2020
BUILD< NO BUILD VOC	Pass	Pass	Pass
BUILD< NO BUILD NOx	Pass	Pass	Pass
BUILD< 1990 EMIS VOC	Pass	Pass	Pass
BUILD< 1990 EMIS NOx	Pass	Pass	Pass

AIR QUALITY PLANNING AREA #4 EMISSIONS (Tons/Summer Day)						
YEAR	2006		2015		2020	
	VOC	NOx	VOC	NOx	VOC	NOx
BUILD	5.612	7.961	5.558	7.550	5.770	7.743
BUDGET	6.440	8.850	6.440	8.850	6.440	8.850

	Results		
Appropriate Test	2006	2015	2020
BUILD< BUDGET VOC	Pass	Pass	Pass
BUILD< BUDGET NOx	Pass	Pass	Pass

PROJECT EMISSIONS

Planning Area Projects Emissions Summary Tables lists all projects in each area that have positive or negative emission impacts.

A positive number indicates a reduction in emissions attributable to the project and a negative number indicates an emissions increase.

PLANNING AREA #1 PROJECT EMISSIONS (Kg/Summer Day)

	Estimated Completion	2006		2015		2020	
Project #	**Year**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**
10460.00		2.77	2.13	14.54	11.18	14.54	11.18
8871.01		23.51	-0.97	13.17	-7.74	8.63	-11.03
10122.00		38.85	46.09	34.89	43.34	34.54	43.13
10336.00		19.43	23.04	17.44	21.67	17.27	21.56
10341.00		7.66	8.31	6.86	8.15	6.79	8.17
TOTALS =		**92.22**	**78.60**	**86.90**	**76.60**	**81.77**	**73.01**

* Exempt projects producing emissions benefits.

** Project adding capacity needing emissions analysis

PLANNING AREA #2 PROJECT EMISSIONS (Kg/Summer Day)

	Estimated Completion	2006		2015		2020	
Project #	**Year**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**
10341.00		**7.64**	**8.39**	**6.86**	**8.22**	**6.79**	**8.24**
TOTALS =		**7.64**	**8.39**	**6.86**	**8.22**	**6.79**	**8.24**

PLANNING AREA #3 PROJECT EMISSIONS (Kg/Summer Day)

	Estimated Completion	2006		2015		2020	
Project #	**Year**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**
10122.00		5.24	6.24	4.71	5.88	4.67	5.85
10336.00		2.62	3.12	2.36	2.94	2.33	2.93
10341.00		2.92	3.49	2.61	3.28	2.59	3.26
TOTALS =		**10.78**	**12.85**	**9.68**	**12.10**	**9.59**	**12.04**

PLANNING AREA #4 PROJECT EMISSIONS							(Kg/Summer Day)
	Estimated Completion	2006		2015		2020	
Project #	Year	VOC	NOx	VOC	NOx	VOC	NOx
10122.00		7.86	9.36	7.07	8.82	7	8.78
10336.00		3.93	4.68	3.53	4.41	3.5	4.39
10341.00		0.4	0.48	0.36	0.45	0.36	0.45
TOTALS =		12.19	14.52	10.96	13.68	10.86	13.62

PROJECT EMISSIONS (LACTS)

Planning area 2 includes Androscoggin and Kennebec Counties. For projects contained within the LACTS area, 100% of the emissions reductions are taken. For projects involving more of Area 2 than the LACTS area, only 22% of the emissions reductions are counted. (Using data from the LACTS Travel Demand Model, approximately 22% of the planning area VMT occurs in the LACTS MPO). Projects within Area 2 existing outside of the LACTS Area are included as part of the Area 2 Emissions Summary.

Assumption: Emissions from projects located within planning area 2 are proportional to VMT.

LACTS Area Emission Reductions for projects							(Kg/Summer Day)
		2006		2015		2020	
TOTAL		VOC	NOx	VOC	NOx	VOC	NOx
		1.7	1.8	1.5	1.8	1.5	1.8

PLANNING AREA #2 PROJECT EMISSIONS							(Kg/Summer Day)
		2006		2015		2020	
Project #	Year	VOC	NOx	VOC	NOx	VOC	NOx
PROJECTS CONTAINED WITHIN THE LACTS AREA:							
TOTALS =		0.00	0.00	0.00	0.00	0.00	0.00
PROJECTS CONTAINED WITHIN AREA 2 INCLUDING THE LACTS AREA							
10341.00		7.64	8.39	6.86	8.22	6.79	8.24
TOTALS =		7.64	8.39	6.86	8.22	6.79	8.24
22% of Total =		1.68	1.85	1.51	1.81	1.49	1.81

PROJECT EMISSIONS (PACTS)

Planning area 1 includes Cumberland, Sagadahoc and York Counties. For projects contained within the PACTS area, 100% of the emissions reductions are taken. For projects involving more of Area 1 than the PACTS area, only 39% of the emissions reductions are counted. (Using data from the Statewide Travel Demand Model, approximately 39% of the planning area VMT occurs in the PACTS MPO.) Projects within Area 1 existing outside of the PACTS Area are included as part of the Area 1 Emissions Summary.

Assumption: Emissions from projects located within planning area 1 are proportional to VMT.

PACTS Area Emission Reductions for projects							**(Kg/Summer Day)**
		2006		**2015**		**2020**	
TOTAL		**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**
		28.48	**32.33**	**37.62**	**39.71**	**37.39**	**39.60**

PLANNING AREA #1 PROJECT EMISSIONS						**(Kg/Summer Day)**	
	Estimated Completion	**2006**		**2015**		**2020**	
Project #	**Year**	**VOC**	**NOx**	**VOC**	**NOx**	**VOC**	**NOx**
PROJECTS CONTAINED WITHIN THE PACTS AREA:							
10460.00		2.77	2.13	14.54	11.18	14.54	11.18
TOTALS =		**2.77**	**2.13**	**14.54**	**11.18**	**14.54**	**11.18**
PROJECTS CONTAINED WITHIN AREA 1 INCLUDING THE PACTS AREA							
10122.00		38.85	46.09	34.89	43.34	34.54	43.13
10336.00		19.43	23.04	17.44	21.67	17.27	21.56
10341.00		7.66	8.31	6.86	8.15	6.79	8.17
TOTALS =		**65.94**	**77.44**	**59.19**	**73.16**	**58.60**	**72.86**
39% of Total =		**25.72**	**30.20**	**23.08**	**28.53**	**22.85**	**28.42**

5) Methodology

The conformity process is complex, not in concept, but in the details. In essence the conformity analysis computes emissions from transportation by multiplying vehicle miles traveled at various speed ranges by the emissions factors for those speeds as generated by EPA's Mobile 5a model. Thus a critical element of the conformity analysis is the traffic demand estimate. The methodology establishes the factors which must be considered in this analysis. These factors include travel demand and transportation system performance, land use patterns, population demographics, employment, economic activity. In 1997, the Department embarked on the development of a Statewide Travel Demand Model. The Department's goal was to develop a tool that could be used to forecast transportation impacts associated with the roadway network in Maine. The travel demand model has the ability to test transportation alternatives, as well as forecast VMT. The growth of VMT, forecasted by the travel demand model, is used as input for air quality conformity purposes.

Vehicle-Miles of Travel (VMT)

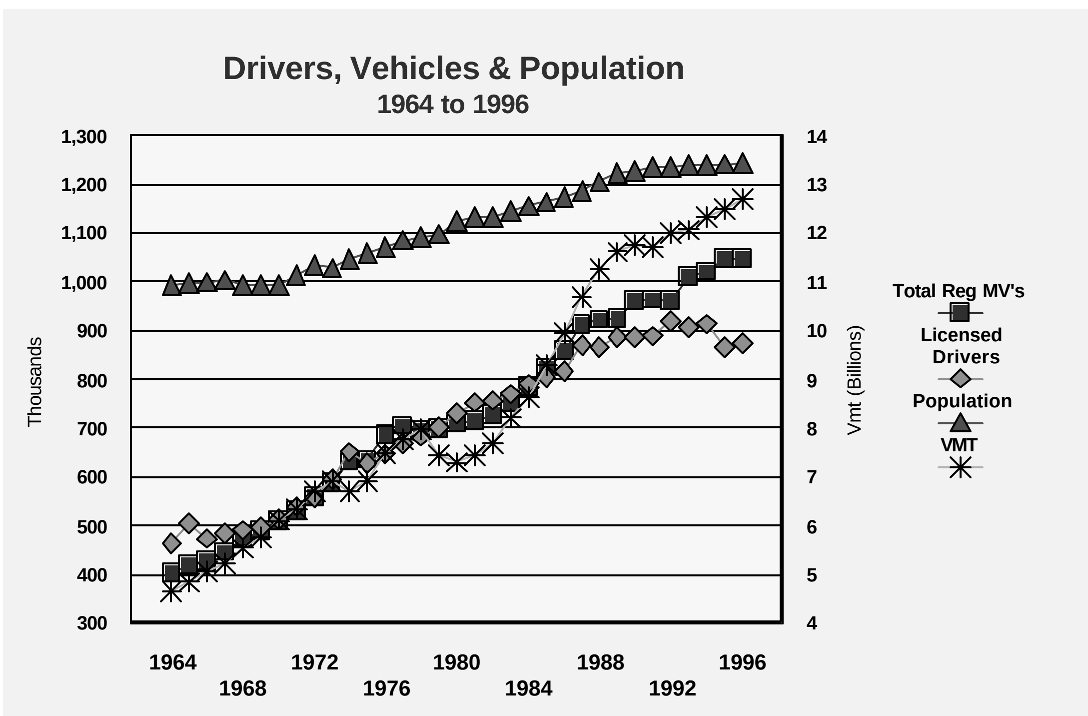
Vehicle-miles-of-travel (VMT) is the estimate of all automobile, bus, and truck travel within a region. The Maine Department of Transportation performs 1300-1400 twenty-four hour traffic counts per year. That data, along with the output of forty continuously operating count sites, is used to derive an annual estimate of statewide VMT. While it is a direct measure of demand on the highway system, it also has value as an indicator of overall travel desires. Figure 3.1 is a graph of VMT for the State of

Maine from 1964 to 1996. There are two dominant factors that influenced this historical data: growth in driving population and economic vitality.

Figure 3-1

Growth in Driving Population

According to US census figures and State Planning Office (SPO) projections, between 1960 and 1996, Maine's population grew by nearly 28%. But the driving public has grown by a larger factor. In 1960, 46% of the total population was licensed to operate a motor vehicle. In 1970, this proportion had risen to 52%; in 1980, to 65%; and in 1996, to 70%. The number of licensed drivers is now equal to the number of eligible citizens. Considering the fact that



approximately 10% of the population experiences some disabling condition, it is reasonable to assume that the proportion of the eligible population holding a license has reached the saturation level. The percentage of the populace within that age group is fluctuating, however, as its ranks swell and subside with the passage of the "baby-boomers". As they live on into the next century, their numbers will have had two major impacts on travel demand. Born between 1946 and 1964, this demographic bulge entered the driving populace in the years spanning 1963-1980. The peak years for the entry of new drivers occurred in the early 1970's. In the 1980's the youngest "boomers" received their licenses, signaling a slowing of the growth of new, young drivers. This slowing was compensated somewhat by the increasing percentage of female license-holders through the same time period, though that growth has since reached its saturation level as well. The oldest members of the boom will reach retirement age after 2005. As the median of this group advances into its sixties, the percentage of Mainers unable to drive is likely to rise.

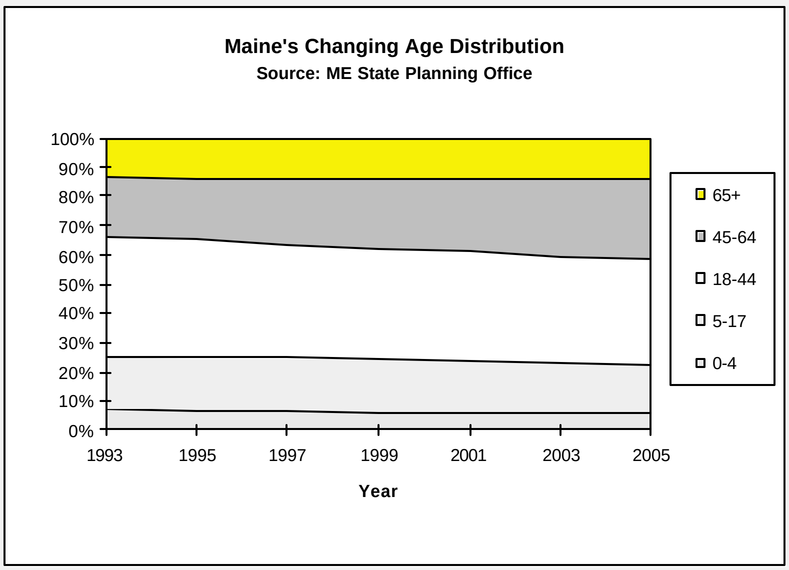


Figure 3.2

Figure 3.2 illustrates age-group populations as a percentage of total population, as projected by the Maine State Planning Office. The only age group showing an increasing share is the 44-65 year-old group. These trends indicate a growth in licensed drivers that will be slightly less than overall population growth through the twenty year period. General population forecasts by the Maine State Planning Office for the 1996-2001 period indicate an expected growth of only 5,000 residents per year-a simple annual growth rate of four/tenths of one percent.

Population/Households

It is important to remember that households are the basic unit of trip generation, while population is the basic unit used for forecasting. The MPO regions were able to provide forecasts of future year households, no such forecasts were available for the non-MPO regions. Therefore population forecasts, after being broken down by municipality and by zone, were used to factor household totals. It was assumed that the distribution of households by size and by levels of auto ownership would remain the same as it is now.

There has been an indication for several years, that automobile ownership has reached saturation level and has become stable. Slight declines may even occur in the future as the population ages. Therefore, an assumption of stable automobile ownership seemed reasonable. Household sizes were projected to continue to decline in the MPO regions, particularly PACTS and LACTS. It did not appear, however, that these declines could be transferred to the non-metropolitan regions of the State. Older cities such as Portland and Lewiston continue to experience increased proportions of single and elderly persons, while families with school-age children are moving into the non-MPO regions, actually increasing household size in some communities. Therefore an assumption of stable household size in non-MPO regions appears to be reasonable.

Employment

ES 202 data are provided by the State on a quarterly basis by Town but do not include all employment categories. Only wage and salary employment is included, with primary exclusions being farm employment and the self-employed. REMI data include all employment and thus are substantially higher than ES 202. Table 3.1 shows comparisons between the two sets of data. Differences are greatest in the Androscoggin-Franklin-Oxford and the Aroostook regions; these areas have the largest concentrations of agricultural employment in the State.

The REMI data are only provided at the level of nine regions in the State of Maine, and include forecast data as well as base year information. REMI is generally considered to be the more reliable forecast for both population and employment and thus is used as the control total. REMI was generated by the University of Southern Maine and is based on both sound econometric principles and national economic data. It tends to provide relatively conservative forecasts and is not influenced by some of the "boosterism" that may impact local and regional forecasts.

Employment forecasts are provided in multiple categories that are generally too numerous for transportation planning purposes. Due to the difficulty of establishing trip attraction rates and the variation that occurs in these rates, it is desirable to establish larger categories of employment. For ES 202, these categories are:

Transportation Categories	ES 202 Sectors
Industrial	Manufacturing
Residual	Mining,Construction,Transportation,Wholesale trade
Trade	Retail
Service	Finance, Service, Public Administration

REMI categories were similar but had some slight differences:

Transportation Categories	REMI Sectors
Industrial	Manufacturing
Residual	Mining,Construction,Transportation and Public Utilities, Wholesale trade, Agriculture/Forestry, Fishing and Farm Employment
Trade	Retail
Service	Finance, Insurance, Real Estate Service, Total Government

Table 3.1

It is important to note that employment is used as a relative measure of trip attraction rather than for calculation of absolute totals. Total trips in the matrix are based on productions and attractions. Some of the employment categories included in the REMI data, but not in the ES 202 are associated with either limited or sporadic travel patterns. Examples are agricultural workers (who often stay at their place of work) and self-employed, who often work at home. As a result, ES-202 totals were originally used to calculate trip attractions in the model. During the calibration phase, REMI totals were tested and found to work more effectively, and were incorporated into the model.

The REMI model is used to establish base year and forecast year population and employment for nine (9) regions in Maine. (Table 3.2) The regions represent a county or a combination of counties. The regions developed for use in the REMI analysis closely match the Air Quality Planning Areas of the state. Although the data *input* to the travel demand model is by region, the travel demand model *output* is at the county and MPO region level. This format allows the travel demand model output data to be analyzed at the State, Air Quality Planning Area or County level.

STATEWIDE TRAVEL DEMAND MODEL REGIONS	
COUNTIES	
Androscoggin – Franklin - Oxford	Knox – Waldo
Aroostook	Lincoln – Sagadahoc
Cumberland	Penobscot – Piscataquis
Hancock –Washington	York
Kennebec – Somerset	
MPO AREAS	
KACTS	LACTS
PACTS	BACTS

Table 3.2

The strong correlation between population, employment (measures of economic activity), and VMT make the REMI model output the best source of data to drive the statewide travel demand model. The statewide travel demand model requires the use of socioeconomic data to estimate travel demand. To forecast population and employment, the REMI econometric model is used.

Economic Activity

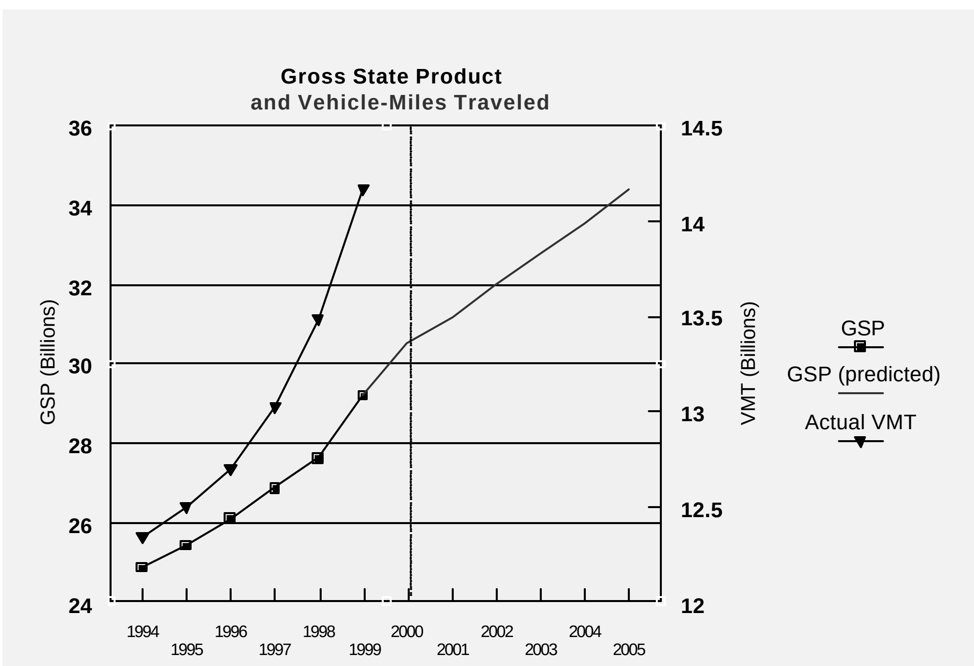
Intuitively, there is a correlation between VMT and economic activity. The strength of that correlation is evident in Figure 3.3. Gross State Product (GSP) is the measure of the total output of Maine's economy. According to the Maine State Planning Office, growth in Maine's GSP has historically followed the national business cycle quite closely. For seven consecutive years (1982-1988), however, Maine outpaced national growth by as much as two full percentage points. That trend reversed during the recent recession, which took a harsher toll on Maine than on the nation. Because of demographic changes, defense cutbacks and global competition, growth in GSP is expected to track national activity, but

at a slightly lower level. The Maine State Planning Office has projected GSP to grow at a compound annual rate of 2.3%.

DATA SOURCE: MDOT, State Planning Figure 3.3

External Travel

Growth factors for external travel are always difficult to select and usually rely on a combination of historical data and/or demographic factors. County level forecasts were available



from both planning commissions in the Seacoast area and from the State of New Hampshire. New Hampshire external links (including those connected to the New Hampshire portion of the model) were assigned either to a single county, or in the case of more significant regional links, a group of Counties. Future year external volumes were factored by the estimated population increase in the adjacent county or counties.

Forecasts were also unavailable for the Canadian border points and recent historical trends have been uneven, varying based on the currency exchange rate. The Maine Counties bordering Canada, project minimal or no growth but it is likely that border traffic will increase at a faster rate than population and employment on either side of the border. A rate of 28%, or approximately 1% per year was applied to Canadian border points.

A separate category of external trips was developed for tourist travel into Maine. The original methodology involved review of population increases in the States that supply the largest number of visitors to Maine, including Massachusetts, Connecticut, Rhode Island, New York and New Jersey. Reviews of these forecasts indicated that there was little or no population growth projected over the next 20-year period. It is likely, however, that recreational travel will continue to increase. An increase of 20% over the, forecast period was used, reflecting less than 5% population growth among the major origin states, but a 28% increase in Maine service employment.

Recreational Travel

Surveys and aggregate statistics related to tourism were used to develop specific parameters of the trip generation model. These sources are discussed in the trip generation chapter. Forecasts of tourist travel were not available, so other socioeconomic variables were used to forecast future numbers of recreational units. The following assumptions were made in forecasting those variables that are used to forecast recreational trips:

- Increases in hotel rooms, motel rooms, campsites and rental cottages were proportional to the increase in service employment
- Increases in summer homes were proportional to the increase in population
- No changes in park acreage were projected.

Induced Growth

The assumptions used as inputs to the REMI model also allow the travel demand model to account for the affects of "induced trips" associated with large projects having regional significance. Induced trips are those "extra" or "new" trips that will use an upgraded facility because accessibility has been improved. This can be accomplished due to the fact that economics, not roadway constraints, are driving the estimated travel produced by the travel demand model. The REMI model assumes that there will be no accessibility constraints in the forecast data. The relationship of the VMT produced by the travel demand model is also consistent with historical ES 202 employment data and VMT as provided by the Department of Labor and the MDOT respectively.

VMT Forecast

The growth in VMT that is produced by the travel demand model, by county and for the State, is presented below.

Annual VMT Growth by County and Statewide	
County	**Growth per Year**
Androscoggin	0.922 %
Aroostook	0.60 %
Cumberland	1.03 %
Franklin	0.94 %
Hancock	1.15 %
Kennebec	0.77 %
Knox	1.47 %
Lincoln	0.69 %
Oxford	1.09 %
Penobscot	1.26 %
Piscataquis	0.47 %
Sagadahoc	0.58 %
Somerset	1.30 %
Waldo	1.30 %
Washington	1.41 %
York	0.89%
Statewide	**1.00 %**

Table 3.3

Average running speeds

The Highway Capacity Manual figures 7-2 and 8-1 (pages v and vi) present relationships between volume and average running speed on multilane and two-lane, two-way highways, respectively. For this analysis, generalized system characteristics were used to approximate Maine-specific, functional class-specific system capacities. These system capacities were used to create straight-line approximations of figure 8-1 for each of the arterial, two-lane functional classes. The three curves in figure 7-2 were also modeled as straight lines, and a fourth curve was approximated to correspond to our rural sections of Interstate that are signed for 65 MPH. **It should be kept in mind that these models produce an average running speed for a given hourly volume of traffic.**

Functional Class System Capacities

The two-lane capacities were used to create f class-specific approximations of figure 8-1 of the HCM. Each line originates at the same point above the origin and makes the LOS E 'break' at the estimated capacity. For multilane highways, a fourth curve was approximated on figure 7-2 from the HCM that reflects our 65 MPH speed limit on rural Interstate. The estimated capacities were then used in the Volume to Capacity (V/C) ratio to calculate speeds from the data.

Both graphs start with freely flowing, low density traffic on the left end of the plot and descend to a point on the right that corresponds to level-of-service (LOS) E. Under ideal conditions, LOS E volumes are 2000 passenger cars-per-hour-per-lane (pcphpl) on multilane, and a two way volume of 2800 pcph on two-lane arterials. **Actual capacities are calculated by applying various factors from the HCM to these ideal flow capacities.** These general capacities were used to modify figures 7-2 and 8-1 to approximate Maine's actual speed-flow characteristics and enable us to use our extensive volume monitoring program to the best advantage.

The VMT By Speed And County Tables

Statistical Analysis Software (SAS) code was used to run the Automatic Traffic Recorder (ATR) data through the models. The tables of Vehicle Miles of Travel broken down by speed ranges and counties are included in the Technical Appendix on pages TA - 62 to TA - 95. The figures in each column represent the daily VMT for the first week in August whose <u>time-weighted average running speed</u> lies within the range indicated in the left hand column.

Time-Weighted Average Running Speeds

The average hourly volumes for each FFC-county grouping were run through the appropriate model as described above. The result was an average running speed for each hour of the day for each FFC-county grouping. **The average of each of these 24 hourly speeds, weighted by the hourly volume of traffic, is the Time-Weighted Average Running Speed** ("AVSP" on the printouts). It is the approximate average speed of all vehicles passing the specified point in a typical summertime 24-hour period. Periods of heavy traffic, with slower speeds, are weighted more heavily in the average because of the higher volumes. Restated, this product is a table of average daily running speeds for each FFC-county grouping. Groupings that were not represented in the population of ATRs were assigned an AVSP from another county. These assignments are documented on a three page printout included in the packet. Default speeds were assigned to non-arterial classes, since the models only apply to arterial flow.

Transportation Integrated Network Information System (TINIS)

VMT for Maine is calculated and maintained in the TINIS database. Briefly stated, TINIS is a non-graphic information system which represents Maine's highway network in the form of 70,000 "link" records and 50,000 "node" records. **Maine's HPMS sample is a subset of the TINIS data base. Approximately 2,250 of the 70,000 link records represent Maine's HPMS sample.** Among the many data elements stored in each "link" record are the traffic count and the length of the link. VMT is the result of multiplying the traffic count on each link by the length of that link. For this analysis, it was reported by Federal Functional Class and county.

MPO VMT Estimates

For projects in the KACTS area, the 1990 comparison utilizes the output from the Statewide Travel Demand model to compare 1990 emissions to the forecast emissions in 2006, 2015 and 2020. The build/no-build analysis also utilizes the Statewide Travel Demand model results but factors in the emissions impacts for those projects that the model is incapable of analyzing.

PROJECT ANALYSIS APPENDIX

Pin #	Applicant	PROJECT TYPE	Plan Area	MPO Area	Page Number
** 8871.01	MDOT	New Road - Gray	1		PA - 1
10460.00	METRO	Natural Gas Station	1	PACTS	PA - 2
10122.00	MDOT	Transit Education	1,3,4	PACTS	PA - 3
10336.00	MDOT	EPS Field Test	1,3,4	PACTS	PA - 6
10341.00	MDOT	Park & Ride Lots	1,2,3,4	PACTS, LACTS	PA - 9

** Project adding capacity needing emissions analysis

Project: 8871.01 Gray

Planning Area Impacted : 1

County: Cumberland

Summary: Adding a new road from the Maine Turnpike btween Routes 4/202 & Route 26
Average Speed is 13 MPH for the No-build and 21 MPH for the Build

Year	Build	No-Build	VMT Change
2006	39,504	36,663	2,841
2015	44,549	37,395	7,154
2020	47,394	37,768	9,626

Emissions Caculations:

	Build Emissions (kg/sd)		No-Build Emissions (kg/sd)		Difference (kg/sd)	
Year	VOCs	NOx	VOCs	NOx	VOCs	NOx
2006	80.98	69.53	104.49	68.56	23.51	-0.97
2015	83.31	66.82	96.48	59.08	13.17	-7.74
2020	87.68	69.20	96.31	58.16	8.63	-11.03

Project: PIN# 10460.00 Compressed Natural Gas Fueling Station

Planning Areas Impacted: 1

Counties: Cumberland

Summary: Construct a fast fill compressed natural gas facility for public and private fleets based in, or operating from the Greater Portland rea.

Assumptions:
* METRO will convert fleet of buses to natural gas. 4 buses by 2004. A total of 21 buses by 2015
* Each existing bus uses an average of 32 gallons of diesel fuel per day
* Assumes that natural gas reduces VOC emissions by 80% over diesel fuel
* Assumes that natural gas reduces NOx emissions by 20% over diesel fuel
* Assumes that diesel engines emit 27.04g/gal of VOC and 83.2g/gal of NOx

Emissions:

						Emissions Factors (grams/gallon/day)			(kg/gallon/day)	
Buses		**Gallons**				**VOC**	**NOx**		**Total VOC**	**Total NOx**
4	X	32	=	128	X	27.04	83.2	=	3.46112	10.6496
21	X	32	=	672	X	27.04	83.2	=	18.17088	55.9104

Year		**Emissions**		**% Reduction**		**Total Emissions Reductions (kg/day)**
2006	VOC	3.46	X	0.8	=	2.768
	NOx	10.65	X	0.2	=	2.13
2015	VOC	18.17	X	0.8	=	14.536
	NOx	55.91	X	0.2	=	11.182
2020	VOC	18.17	X	0.8	=	14.536
	NOx	55.91	X	0.2	=	11.182

Project: PIN 10122 - Transit Education Program

Planning Areas Impacted: 1, 3, 4
Counties: Cumberland, Hancock, Knox, Lincoln, Sagadahoc, Waldo, York

Summary:

Phase I To 'brand' Explore Maine with a comprehensive, consistant message and professional look including logo, tagline, print medium & collateral material, and website.
~~Explore Maine~~ branding components:
 - Mode identification: Island Explorer, Mountain Explorer, Coastal Explorer, Marine (Ocean) Explorer, River Explorer, Campus Explorer, City (Urban, Metropolitan) Explorer. Could also be defined by region or specific area.
 - Subtle background role by MDOT
 - Champion and promote the vision of the ~~Explore Maine~~ (Strategic Passenger Transportation Plan)
 - Promote each transportation mode; ~~Explore Maine~~\rail, ferry, transit, bike, commuters, park & ride.

Phase II To design Explore Maine website (include all branding components indicated above).
 - Acquire information by destination, mode, and key words
 - Include maps, schedules, and intermodal connectivity
 - User-friendly navigation
 - Easy to revise information (using MDOT's webmaster)
 - Link with all appropriate websites including tourism
To design new website for Explore Maine, including designing and producing maps for transit and Park & Ride lots

Emissions Reductions:

Year		VMT reduced		Emissions Factor (grams/ mile)		Yearly Emissions Reductions (kg)	Daily Emissions Reductions (kg/day)
Area 1							
2006	VOC	12,695,360	x	1.12	=	14,181	38.85
	NOx	12,695,360		1.33	=	16,821	46.09
2015	VOC	12,695,360	x	1.00	=	12,733	34.89
	NOx	12,695,360		1.25	=	15,818	43.34
2020	VOC	12,695,360	x	0.99	=	12,606	34.54
	NOx	12,695,360		1.24	=	15,742	43.13
Area 3							
2006	VOC	1,701,440	x	1.12	=	1,912	5.24
	NOx	1,701,440		1.34	=	2,278	6.24
2015	VOC	1,701,440	x	1.01	=	1,720	4.71
	NOx	1,701,440		1.26	=	2,147	5.88
2020	VOC	1,701,440	x	1.00	=	1,703	4.67
	NOx	1,701,440		1.26	=	2,137	5.85
Area 4							
2006	VOC	2,552,160	x	1.12	=	2,869	7.86
	NOx	2,552,160		1.34	=	3,417	9.36
2015	VOC	2,552,160	x	1.01	=	2,580	7.07
	NOx	2,552,160		1.26	=	3,221	8.82
2020	VOC	2,552,160	x	1.00	=	2,555	7.00
	NOx	2,552,160		1.26	=	3,206	8.78

Project: PIN 10122 - Transit Education Program (cont.)

Based on 1999 Actual VMT data, the following numbers represent the percentage of vehicle miles traveled by Air Quality Planning Area.

Area 1	38.79%
Area 3	5.24%
Area 4	7.82%

Assumptions provided by the Office of Passenger Transportation:

2000 Maine tourism statistics*

34,800,000 day travelers
9,400,000 overnight travelers
43,700,000 total travelers

Average trip length for leisure is 500 miles**
Assume day trips average 100 miles
U.S. average mode shift is 5.5% of trips by train, bus, or ferry. For this analysis we have lowered to 2.75% to reflect rural character of Maine.

For this analysis, we assume that a 1% increase in alternative modes will be the result of this investment, resulting in reduced vehicle miles traveled.

Additional Assumptions:

Assume 2.5 passenger per car
Assume vehicles removed would be light-duty gas vehicles.
Assume average speed of tourist traffic to be 41 mph.

Day trips reduced:

34,800,000 day trips x 1% mode shift = 348,000 travelers, averaging 2.5 passengers per vehicle = 139,200 vehicles removed.

139,200 vehicles x 100 miles = 13,920,000 VMT reduced

Overnight trips reduced:

9,400,000 day trips x 1% mode shift = 94,000 travelers, averaging 2.5 passengers per vehicle = 37,600 vehicles removed.

37,600 vehicles x 500 miles = 18,800,000 VMT reduced

TOTAL VMT REDUCED:		**% Reduction by Planning Area**			**Total Reduction by Planning Area**		
		1	**3**	**4**	**1**	**3**	**4**
Day trips:	13,920,000	38.8%	5.2%	7.8%	5,400,960	723,840	1,085,760
Overnight trips:	18,800,000	38.8%	5.2%	7.8%	7,294,400	977,600	1,466,400
Total:	32,720,000	38.8%	5.2%	7.8%	12,695,360	1,701,440	2,552,160

*Office of Tourism
**US DOT Bureau of Transportation Statistics American Travel Survey

Project: PIN 10122 - Transit Education Program (cont.)

Total 1999 Actual VMT provided by MDOT, Highway Performance Monitoring System

Androscoggin	875,511,148	6.2%
Aroostook	768,713,995	5.4%
Cumberland	2,964,299,126	20.9%
Franklin	340,964,428	2.4%
Hancock	702,604,659	5.0%
Kennebec	1,400,049,312	9.9%
Knox	364,269,616	2.6%
Lincoln	377,470,495	2.7%
Oxford	544,917,343	3.8%
Penobscot	1,618,798,221	11.4%
Piscataquis	184,588,015	1.3%
Sagadahoc	440,964,471	3.1%
Somerset	655,544,847	4.6%
Waldo	404,869,800	2.9%
Washington	426,897,813	3.0%
York	2,085,584,913	14.7%
Total Actual VMT	14,156,048,202	100.0%

Percentage of Vehicle Miles Traveled by Air Quality Planning Area

Area 1 - Cumb, Sag, York	38.8%
Area 3 - Knox, Lincoln	5.2%
Area 4 - Waldo, Hancock	7.8%

Project: PIN 10336 - EPS Field Test

Planning Areas Impacted: 1, 3, 4
Counties: Cumberland, Hancock, Knox, Lincoln, Sagadahoc, Waldo, York

Summary:

The EPS (electronic payment system) Field Test proposes to apply innovative payment system technologies, including smart cards; to promote and support the Department of Transportation's Strategic Passenger Transportation Plan, the ~~Explore Maine~~ program, and traditional transit applications. This project will be the initial step in implementing an integrated, multi-modal, payment system and providing recommendations to define a preliminary design concept, including potential partners, target market segments, potential benefits and implementation issues.

The goal of this project is to develop a system design concept and implementation strategy for an integrated, multi-modal transportation payments system that offers an enhanced level of access and customer service to its users while also providing for an opportunity to improve service efficiencies.

Emissions Reductions:

Year		VMT reduced		Emissions Factor (grams/ mile)		Yearly Emissions Reductions (kg)	Daily Emissions Reductions (kg/day)
Area 1							
2006	VOC	6,347,680	x	1.12	=	7,090	19.43
	NOx	6,347,680		1.33	=	8,411	23.04
2015	VOC	6,347,680	x	1.00	=	6,367	17.44
	NOx	6,347,680		1.25	=	7,909	21.67
2020	VOC	6,347,680	x	0.99	=	6,303	17.27
	NOx	6,347,680		1.24	=	7,871	21.56
Area 3							
2006	VOC	850,720	x	1.12	=	956	2.62
	NOx	850,720		1.34	=	1,139	3.12
2015	VOC	850,720	x	1.01	=	860	2.36
	NOx	850,720		1.26	=	1,074	2.94
2020	VOC	850,720	x	1.00	=	852	2.33
	NOx	850,720		1.26	=	1,069	2.93
Area 4							
2006	VOC	1,276,080	x	1.12	=	1,434	3.93
	NOx	1,276,080		1.34	=	1,709	4.68
2015	VOC	1,276,080	x	1.01	=	1,290	3.53
	NOx	1,276,080		1.26	=	1,610	4.41
2020	VOC	1,276,080	x	1.00	=	1,277	3.50
	NOx	1,276,080		1.26	=	1,603	4.39

Project: PIN 10336 - EPS Field Test (cont.)

Based on 1999 Actual VMT data, the following numbers represent the percentage of vehicle miles traveled by Air Quality Planning Area.

Area 1	38.79%
Area 3	5.24%
Area 4	7.82%

Assumptions provided by the Office of Passenger Transportation:

2000 Maine tourism statistics*

34,800,000 day travelers
9,400,000 overnight travelers
43,700,000 total travelers

Average trip length for leisure is 500 miles**
Assume day trips average 100 miles
U.S. average mode shift is 5.5% of trips by train, bus, or ferry. For this analysis we have lowered to 2.75% to reflect rural character of Maine.

For this analysis, we assume that a 0.5% increase in alternative modes will be the result of this investment, resulting in reduced vehicle miles traveled.

Additional Assumptions:

Assume 2.5 passenger per car
Assume vehicles removed would be light-duty gas vehicles.
Assume average speed of tourist traffic to be 41 mph.

Day trips reduced:

34,800,000 day trips x 0.5% mode shift = 174,000 travelers, averaging 2.5 passengers per vehicle = 69,600 vehicles removed.

69,600 vehicles x 100 miles = 6,960,000 VMT reduced

Overnight trips reduced:

9,400,000 day trips x 0.5% mode shift = 47,000 travelers, averaging 2.5 passengers per vehicle = 18,800 vehicles removed.

18,800 vehicles x 500 miles = 9,400,000 VMT reduced

TOTAL VMT REDUCED:		**% Reduction by Planning Area**			**Total Reduction by Planning Area**		
		1	**3**	**4**	**1**	**3**	**4**
Day trips:	6,960,000	38.8%	5.2%	7.8%	2,700,480	361,920	542,880
Overnight trips:	9,400,000	38.8%	5.2%	7.8%	3,647,200	488,800	733,200
Total:	16,360,000	38.8%	5.2%	7.8%	6,347,680	850,720	1,276,080

*Office of Tourism
**US DOT Bureau of Transportation Statistics American Travel Survey

Project: PIN 10336 - EPS Field Test (cont.)

Total 1999 Actual VMT provided by MDOT, Highway Performance Monitoring System

Androscoggin	875,511,148	6.2%
Aroostook	768,713,995	5.4%
Cumberland	2,964,299,126	20.9%
Franklin	340,964,428	2.4%
Hancock	702,604,659	5.0%
Kennebec	1,400,049,312	9.9%
Knox	364,269,616	2.6%
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Penobscot	1,618,798,221	11.4%
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Somerset	655,544,847	4.6%
Waldo	404,869,800	2.9%
Washington	426,897,813	3.0%
York	2,085,584,913	14.7%
Total Actual VMT	14,156,048,202	100.0%

Percentage of Vehicle Miles Traveled by Air Quality Planning Area

Area 1 - Cumb, Sag, York	38.8%
Area 3 - Knox, Lincoln	5.2%
Area 4 - Waldo, Hancock	7.8%

Project: PIN 10341 Park & Ride Lots

Planning Areas Impacted: 1, 2, 3

Summary:

This project will build five park & ride lots. These lots will support carpools, vanpools, and commuter buses.

Assumptions:

- Commuter buses assumed to be HDDV
- Vans assumed to be LDGT2
- Vehicles eliminated from the road assumed to be LDGV
- Average speed for all vehicles assumed to be 41 mph.

Emissions Analysis:

	LDGT2 (created)		LDGT2 Emissions Factors (grams/mile)			LDGT2 created (Kg/day)		HDDV (created)		HDDV Emissions Factors (grams/mile)			HDDV created (Kg/day)		TOTAL created (Kg/day)	
YEAR	VMT		VOC	NOx		VOC	NOx	VMT		VOC	NOx		VOC	NOx	VOC	NOx
Area 1																
2006	104	x	1.83	2.12	=	0.19	0.22	140	x	1.15	6.91	=	0.16	0.97	0.35	1.19
2015	104	x	1.68	2.03	=	0.17	0.21	140	x	1.14	4.09	=	0.16	0.57	0.34	0.78
2020	104	x	1.66	2.02	=	0.17	0.21	140	x	1.14	3.62	=	0.16	0.51	0.33	0.72
Area 2																
2006	52	x	1.89	2.19	=	0.10	0.11	130	x	1.15	6.91	=	0.15	0.90	0.25	1.01
2015	52	x	1.76	2.11	=	0.09	0.11	130	x	1.14	4.09	=	0.15	0.53	0.24	0.64
2020	52	x	1.74	2.10	=	0.09	0.11	130	x	1.14	3.62	=	0.15	0.47	0.24	0.58
Area 3																
2006	212	x	1.89	2.19	=	0.40	0.46	0	x	0.00	0.00	=	0.00	0.00	0.40	0.46
2015	212	x	1.76	2.11	=	0.37	0.45	0	x	0.00	0.00	=	0.00	0.00	0.37	0.45
2020	212	x	1.74	2.10	=	0.37	0.45	0	x	0.00	0.00	=	0.00	0.00	0.37	0.45

	LDGV eliminated		LDGV Emissions Factors (grams/mile)			LDGV reduced (Kg/day)	
YEAR	VMT		VOC	NOx		VOC	NOx
Area 1							
2006	7170	x	1.12	1.33	=	8.01	9.50
2015	7170	x	1.00	1.25	=	7.19	8.93
2020	7170	x	0.99	1.24	=	7.12	8.89
Area 2							
2006	7020	x	1.12	1.34	=	7.89	9.40
2015	7020	x	1.01	1.26	=	7.10	8.86
2020	7020	x	1.00	1.26	=	7.03	8.82
Area 3							
2006	2954	x	1.12	1.34	=	3.32	3.96
2015	2954	x	1.01	1.26	=	2.99	3.73
2020	2954	x	1.00	1.26	=	2.96	3.71
Area 4							
2006	360	x	1.12	1.34	=	0.40	0.48
2015	360	x	1.01	1.26	=	0.36	0.45
2020	360	x	1.00	1.26	=	0.36	0.45

Emissions Benefits:

		Emissions Savings (Kg/day) reduced - created	
		VOC	NOx
Area 1			
Year	2006	7.66	8.31
	2015	6.86	8.15
	2020	6.79	8.17
Area 2			
Year	2006	7.64	8.39
	2015	6.86	8.22
	2020	6.79	8.24
Area 3			
Year	2006	2.92	3.49
	2015	2.61	3.28
	2020	2.59	3.26
Area 4			
Year	2006	0.40	0.48
	2015	0.36	0.45
	2020	0.36	0.45

Project: PIN 10341 Park & Ride Lots (cont.)

Distances:

- The average round trip distance from Lewiston/Auburn to BIW is 54 miles, with 28 miles in Planning Area 1 and 26 miles in Planning Area 2.
- The average round trip distance from Lewiston/Auburn to the Brunswick Area is 36 miles, with 16 miles in Planning Area 1 and 20 miles in Planning Area 2.
- The average round trip distance from Waldoboro to BIW is 52 miles, with 40 miles in Planning Area 3 and 12 miles in Planning Area 1.
- The average round trip distance from Waldoboro to Brunswick is 62 miles, with 40 miles in Planning Area 3 and 22 miles in Planning Area 1.
- The average round trip distance from Bass Harbor to Bar Harbor is 18 miles.
- The average round trip distance from Thomaston to BIW is 78 miles, with 66 miles in Planning Area 3 and 12 miles in Planning Area 1.
- The average round trip distance from Thomaston to Brunswick is 86 miles, with 66 miles in Planning Area 3 and 20 miles in Planning Area 1.
- The average round trip distance from Thomaston to Camden is 12 miles, all in Planning Area 3.

Park & Ride Assumptions provided by the Office of Passenger Transportation:

~~1. Lewiston-Auburn, 250 spaces total~~

a. 200 traveling to BIW in Bath by commuter bus (HDDV)

Area 1 - 5 buses x 28 miles a day = 140 VMT created
Area 2 - 5 buses x 26 miles a day = 130 VMT created

Area 1 - 200 commuters x 28 miles a day = 5600 VMT eliminated
Area 2 - 200 commuters x 26 miles a day = 5200 VMT eliminated

b. 15 local commuters who will use local bus service

Area 2 - 15 passengers x 10 miles a day = 150 VMT eliminated

c. 10 spaces for car pools to Augusta

Area 2 - 10 passengers x 60 miles a day = 600 VMT eliminated

d. 10 for Freeport, Brunswick, and Topsham commuters who will car pool

Area 1 - 10 x 16 miles a day = 160 VMT eliminated
Area 2 - 10 x 20 miles a day = 200 VMT eliminated

Lot 1 totals:

	Bus VMT created	Car VMT eliminated
Area 1	140	5760
Area 2	130	6150

Project: PIN 10341 Park & Ride Lots (cont.)

2. Sabattus Park and Ride Lot, 30 vehicles

a. 20 traveling to BIW by van (LDGT2)

Area 1 - 2 vans x 28 miles a day = 56 VMT created
Area 2 - 2 vans x 26 miles a day = 52 VMT created

Area 1 - 20 commuters x 28 miles a day = 560 VMT eliminated
Area 2 - 20 commuters x 26 miles a day = 520 VMT eliminated

b. 5 spaces for commuters to Augusta who will carpool

Area 2 - 5 commuters x 50 miles a day = 250 VMT eliminated

c. 5 spaces for Brunswick commuters

Area 1 - 5 commuters x 16 miles a day = 80 VMT eliminated
Area 2 - 5 commuters x 20 miles a day = 100 VMT eliminated

Lot 2 totals:

	Van VMT created	Car VMT eliminated
Area 1	56	640
Area 2	52	870

3. Waldoboro Park and Ride, 35 vehicles

a. 30 spaces for BIW commuters who will vanpool (LDGT2)

Area 1 - 2 vans x 12 miles a day = 24 VMT created
Area 3 - 2 vans x 40 miles a day = 80 VMT created

Area 1 - 30 commuters x 12 miles a day = 360 VMT eliminated
Area 3 - 30 commuters x 40 miles a day = 1200 VMT eliminated

b. 5 spaces for commuters to Brunswick who will car pool =

Area 1 - 5 commuters x 22 miles a day = 110 VMT eliminated
Area 3 - 5 commuters x 40 miles a day = 200 VMT eliminated

Lot 3 totals:

	Van VMT created	Car VMT eliminated
Area 1	24	470
Area 3	80	1400

Project: PIN 10341 Park & Ride Lots (cont.)

4. Bass Harbor, 30 spaces (10 for MSFS)

Area 4 - 20 commuters x 18 miles a day = 360 VMT eliminated

Lot 4 totals:

	Van VMT created	Car VMT eliminated
Area 4	0	360

5. Thomaston Park and Ride, 26 vehicles

a. 20 spaces for BIW commuters who will vanpool

Area 1 - 2 vans x 12 miles a day = 24 VMT created

Area 3 - 2 vans x 66 miles a day = 132 VMT created

Area 1 - 20 commuters x 12 miles a day = 240 VMT eliminated

Area 3 - 20 commuters x 66 miles a day = 1320 VMT eliminated

b. 3 spaces for commuters to Brunswick who will carpool

Area 1 - 3 commuters x 20 miles a day = 60 VMT eliminated

Area 3 - 3 commuters x 66 miles a day = 198 VMT eliminated

c. 3 spaces for commuters to Camden

Area 3 - 3 commuters x 12 miles a day = 36 VMT eliminated

Lot 5 totals:

	Van VMT created	Car VMT eliminated
Area 1	24	300
Area 3	132	1554

VMT Summary:

	VMT Created by Vans (LDGT2)	VMT Created by Commuter Buses (HDDV)	VMT Eliminated by Cars (LDGV)
Area 1	104	140	7170
Area 2	52	130	7020
Area 3	212	0	2954
Area 4	0	0	360